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(71) Applicant(s)

General Engineering (Netherlands) B.V.

(Incorporated in the Netherlands)

P.O. Box 85007, 3508 AA Utrecht, Netherlands

(72) Inventor(s)

Martin Lindstrom

(74) Agent and/or Address for Service

Forrester Ketley & Co  
Forrester House, 52 Bounds Green Road, LONDON,  
N11 2EY, United Kingdom

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B60R 21/16

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US 5048863 A

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UK CL (Edition L) B7B BSB

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## (54) Vehicle air bags

(57) The bag is provided with one or more tear elements (8) which, on inflation of the bag, initially limit the interior volume then tear as the bag is inflated, thus increasing the interior volume of the bag. In another embodiment, Fig 8, interior ties 48 are provided with tearable portions 55 to provide staged inflation.

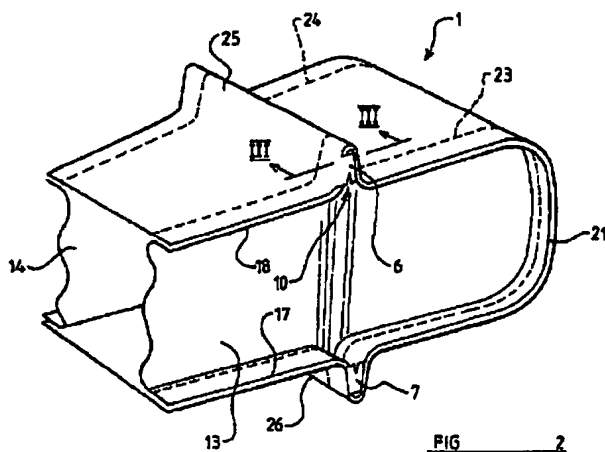


FIG 2

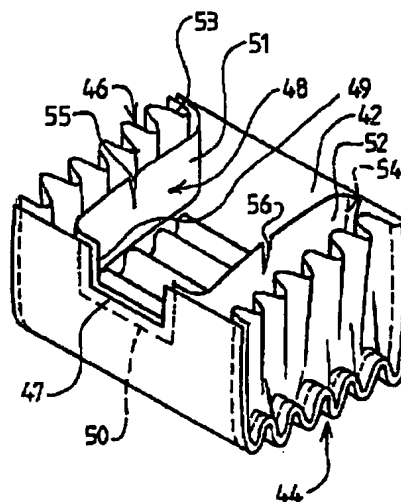


FIG 6

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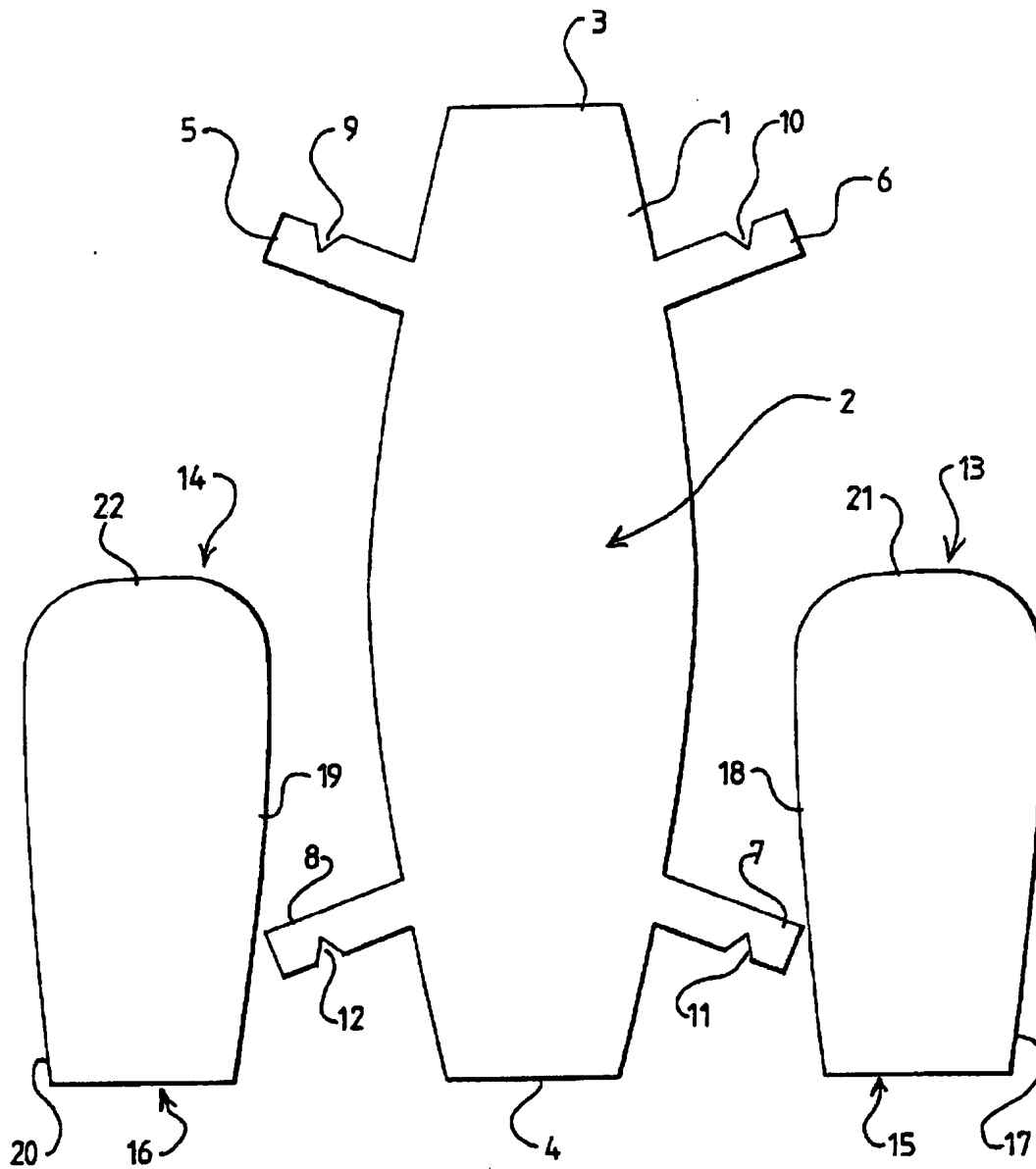
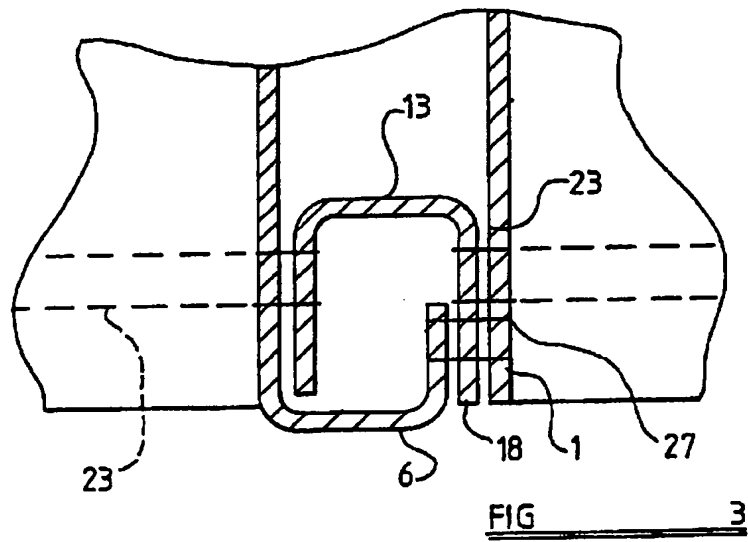
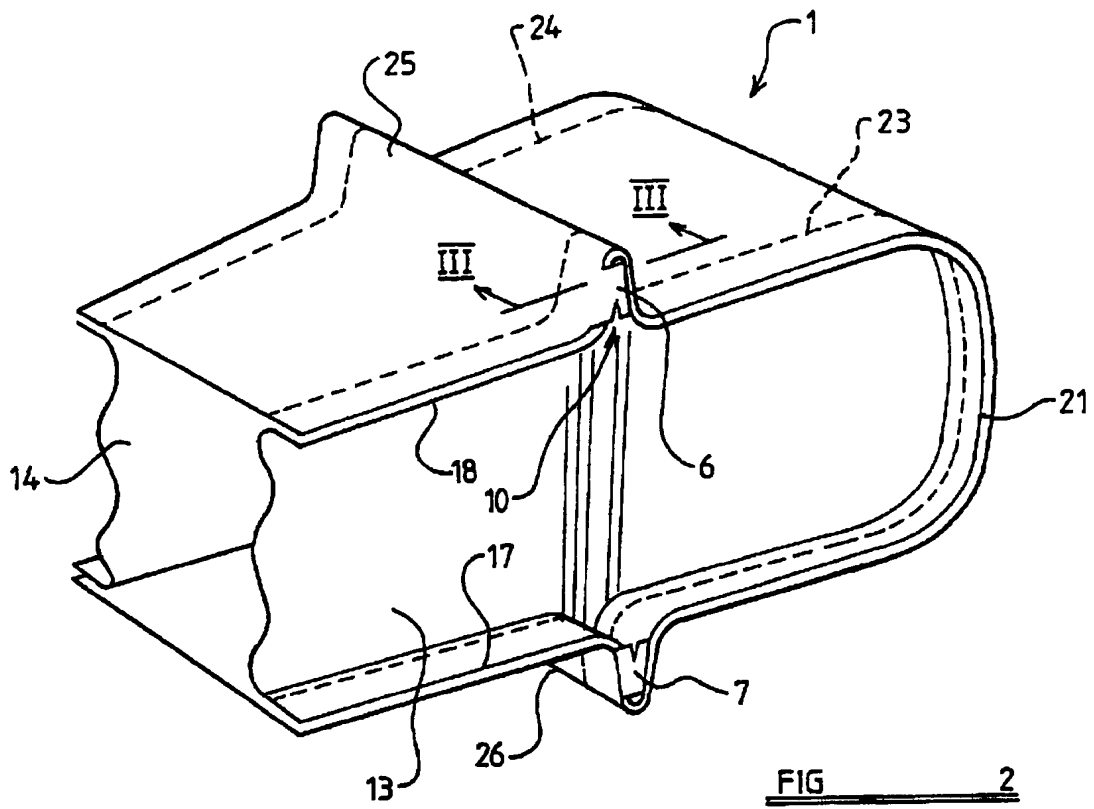


FIG 1

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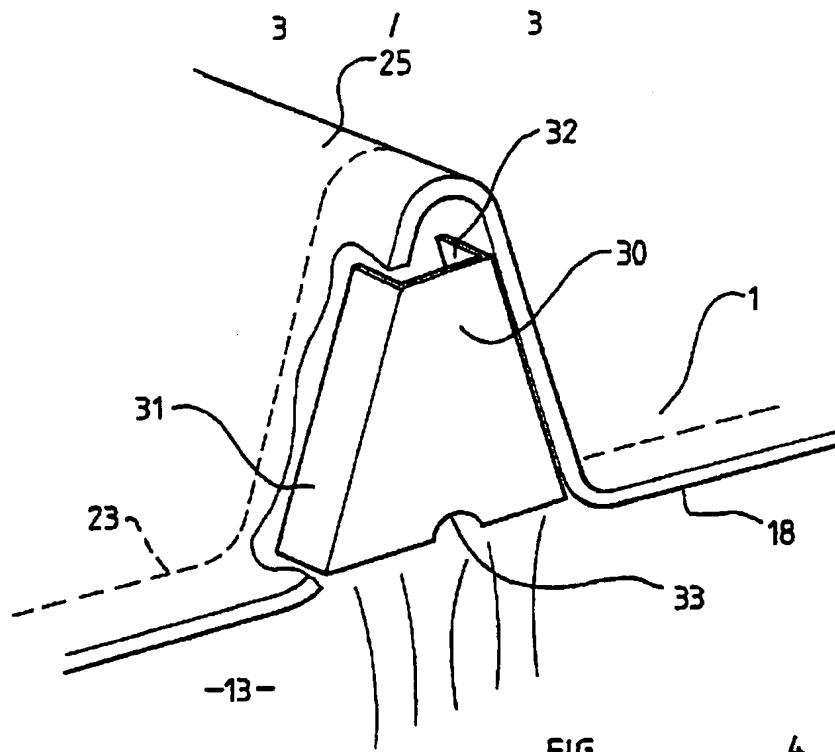


FIG 4

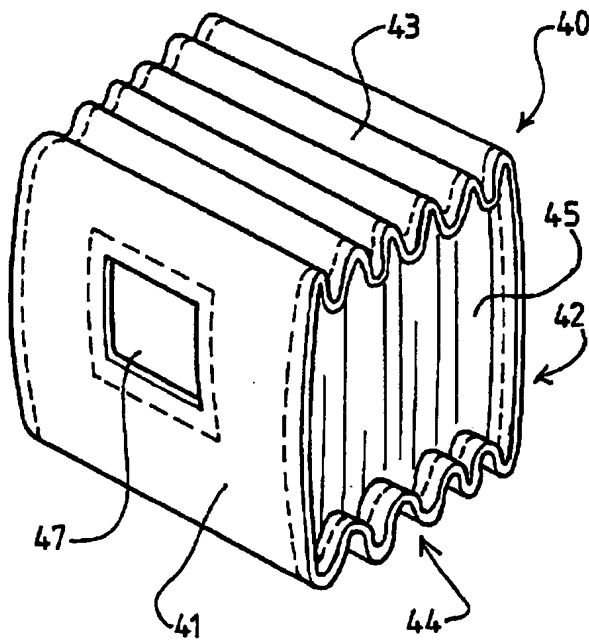


FIG 5

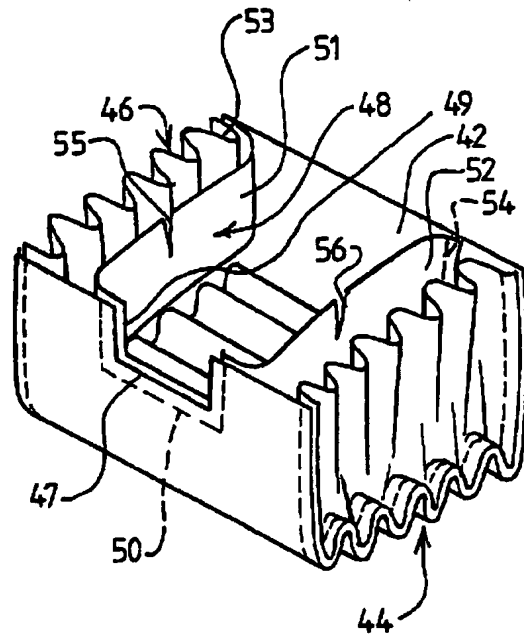


FIG 6

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DESCRIPTION OF INVENTION

"IMPROVEMENTS IN OR RELATING TO AN AIR-BAG ARRANGEMENT"

THE PRESENT INVENTION relates to an air-bag arrangement, and more particularly relates to an air-bag arrangement adapted to protect or driver or passenger in a motor vehicle such as a motor car.

It has been proposed to provide an air-bag in a motor car positioned in front of the driver or in front of a passenger of the motor car, the bag being adapted to inflate in the event that an accident arises. The bag thus provides a "cushion" for the driver or the passenger.

The design of air-bags is now very sophisticated and the bag is adapted to be inflated before the driver or passenger is thrown forwardly within the motor vehicle during an accident.

Reference may be made to EP-A-0344422 which discloses a bag in which parts of the bag are folded together to form a "tuck" by stitching, the stitching forming a "tear seam". The main purpose of this is to control the way that the bag is inflated. Thus the "tear seam" effectively controls the speed of inflation or the direction in which the bag expands during inflation so that the bag, when it is inflated, does not hit the driver or passenger with a significant force. The "tear seam" is designed to tear or rip, enabling the "tuck" to open out at a predetermined instant during the inflation of the bag

thus effectively increasing the permissible interior volume of the bag at that instant.

One disadvantage of the system of EP-A-0344422 is that the "tear seam" comprises stitching which passes through part of the bag and which forms the boundary between the interior of the bag and the exterior of the bag. When the "tear seam" tears or rips, either the thread forming the stitching can break or the fabric in the region of the seam can tear. It is possible that the fabric will tear along the line of the stitching, since the fabric will have been pierced by the needle when the stitches have been put in place, and the fabric may thus have been punctured or weakened in the line of the stitching. However, it is also possible that the fabric adjacent the actual stitching may tear or rip. In any event, it is quite possible that the fabric of the bag may become damaged. If the fabric of the bag is damaged, and is apertured, the bag may deflate in an undesirable manner, and the bag will then not provide the desired cushioning effect.

The present invention seeks to provide an improved air-bag arrangement.

According to this invention there is provided an inflatable bag adapted to protect a driver or passenger in a motor vehicle, the bag being formed from fabric, portions of the fabric being secured together by securing seams, wherein the bag is provided with one or more tearable means, the or each tearable means comprising an element of fabric provided with an area of weakness at which the fabric is designed to tear, the tearable means being so located that when the bag is exposed to an internal pressure in excess of a predetermined pressure, the tearable means tear and control the way the bag is

inflated, the interior volume of the bag being greater when the tearable means have broken than before the tearable means have broken, the tearable means, comprising elements which do not contribute to the integrity of the bag.

Thus, when the bag is inflated and the tearable means tear, the integrity of the bag is not affected, and the bag remains substantially air-tight.

Preferably the tearable means comprise one or more elements of fabric each provided with a notch or recess, or aperture to define said area of weakness at which tearing across the fabric can occur.

The tearable means may comprise fabric that is formed integrally with the fabric forming the bag or may comprise separate elements which are secured to the fabric forming the bag.

The fabric of the tearable means may be flame-retardant fabric.

Conveniently the fabric of the tearable means is secured to the fabric defining the air-bag at a position surrounding an aperture formed in the material forming the air-bag intended to provide an inlet for gas from a gas generator.

In one arrangement one or both ends of each tearable means is secured to the bag by a seam provided to hold areas or components of the bag together, but alternatively one or both ends of the tearable means is secured to the fabric forming the bag by a seam which serves the sole purpose of securing the tearable means to the fabric of the bag.

In one embodiment the or each tearable means extends across a tuck formed in the bag, but alternatively the or each tearable means extends across parts of the bag which are of "concertina" form.

In one arrangement the or each tearable means is on the exterior of the bag, but alternatively the or each tearable means is on the interior of the bag.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which

FIGURE 1 is a plan view of the component "blanks" used in constructing a bag in accordance with the invention,

FIGURE 2 is a perspective view of the bag made from the components of Figure 1,

FIGURE 3 is a sectional view taken on the line III-III of Figure 2,

FIGURE 4 is a perspective view with parts cut away of an alternative embodiment of the invention,

FIGURE 5 is a perspective view of yet another embodiment of the invention, and

FIGURE 6 is a view corresponding to Figure 5 but with parts cut away to illustrate the operative parts of the invention.

Referring initially to Figure 1 the component parts of an air-bag are illustrated. The components comprise a first or central component 1 formed of fabric or an appropriate fabric laminate, the component 1 being of elongate form and having a central region 2 which is of greater width than the widths of the ends 3,4.

At positions intermediate the central region 2 and each end, the component 1 is provided with four substantially symmetrically located projecting tabs 5,6,7,8 which extend outwardly from the edges of the component, each of rectangular form and each formed integrally with the component 1. Each tab is provided, in one long side thereof, with a substantially "V"-shaped notch 9,10,11,12.

Figure 1 illustrates two further components 13,14 each of the same form. The components 13,14 are formed of the same fabric or laminate as the component 1. Each component 13,14 is of elongate form, having a length approximately half the length of the component 1. Each component 13,14 has a relatively narrow end 15,16 and has diverging side walls 17,18,19,20 leading to a larger end 21,22 at the end opposed to the narrow end 15,16.

The components of Figure 1 may be assembled to form an air-bag having the general configuration shown in Figure 2. It is to be observed that the main component 1 is folded to have a substantially "U"-shaped form, to form, in the orientation illustrated, the bottom, end and top of an air-bag, and the components 13 and 14 are located in position to form the side walls of the air-bag.

The side walls 17,18 and the end wall 21 of the component 13 are aligned with one edge of the component 1 and stitched in position by means of stitching 23. The

component 14 is placed in position in a similar way and is retained by stitching 24.

At this stage of fabrication the bag has the four tabs 5,6,7 and 8 projecting outwardly.

Subsequently two "tucks" 25,26 are formed on opposite sides of the bag, in the region of the tabs 5,6,7,8. As can be seen most clearly by considering Figure 2 and Figure 3, the tab 6 extends across the tuck 25, and is stitched, by means of stitching 27 provided for that purpose to the edge 18 of the component 13 (and also to the edge of the main component 1) on the opposite side of the tuck. Thus, the tab 6 has one end formed integrally with the main component 1 and has the other end stitched to the main component 1, the tab extending across a tuck 25. It can be seen that each of the tabs 5,6,7 and 8 is stitched in position in this way.

The tabs serve to retain the tucks 25,26 in position, thus limiting the total volume of the interior of the air-bag.

It is to be appreciated, however, that when the air-bag is inflated, when the air-bag reaches a fully inflated condition as illustrated in Figure 2, a significant force will be applied to the tabs 5,6,7,8 and the tabs 5,6,7,8 will tear transversely, the tears being aligned with the notch 9,10,11,12 provided in the tabs. The notch is, of course, provided for this very purpose and ensures that the tab tears at a position which is substantially central between the two ends of the tab, that is to say the end formed integrally with the main component 1 and the end that is stitched to the main component 1.

Thus each notch serves to define an area of less width, and thus of relative weakness, at which the tab is designed to tear. The amount of, and strength of the fabric between the end of the V notch and the other side of the tab determines the force needed to make the tab tear. Different tabs may be designed to tear at different forces to control the inflation of the bag. As the tabs tear, the tucks 25,26 are released, thus increasing the maximum permissible volume of the bag. It is to be observed that the tabs 5,6,7,8 do not form any part of the bag that constitutes the boundary between the interior of the bag and the exterior of the bag. Thus, any damage effected to the tabs 5,6,7,8 does not in any way influence the integrity of the bag.

It is thus to be appreciated that by providing tear tabs of the type described above, the inflation of the air-bag may be controlled without any risk of the integrity of the air-bag being damaged.

Figure 4 illustrates an embodiment of the invention which is very similar to that of Figures 1 to 3. Like references refer to like parts which will not be re-described. In the embodiment of Figure 4, however, a tear tab 30 is provided which is totally separate from the main components of the bag. The tear tab 30 comprises a substantially triangular shaped element of fabric, which may be a fabric completely different from the fabric forming the components 1, 13 and 14 of the air-bag. The fabric of the tear tab 30 will not be exposed to hot gas within the interior of the air-bag, and is thus selected purely for its physical or "tearing" properties rather than its heat-resisting properties. The tear tab 30 is provided with two rearwardly folded flaps 31,32 which are stitched to regions adjacent the edge 18 of the component 13 on

opposite sides of a tuck 25. The stitching will, of course, also pass through the edge region of the main component 1 in the vicinity of the tuck. The stitching may be stitching provided solely for the purpose of holding the tab 30 in position, or may comprise the stitching 23 provided primarily to secure the main component 1 and the components 13.

The tear tab 30 is provided with a notch or recess 33 in its lower edge provided to form an initiating point for a tear. The air-bag of the embodiment of Figure 4 will operate in the same way as the air-bag of the embodiment of Figures 1 to 3.

Turning now to Figures 5 and 6, a further embodiment of the invention is illustrated.

In this embodiment of the invention an air-bag 40 is provided having a front wall 41, a rear wall 42 interconnected by upper and lower walls 43,44 of "concertina" form. Side walls 45,46 are stitched in position, the side walls also being of substantially "concertina" form.

An aperture 47 is formed in the front wall 41 to constitute an inlet for gas from a gas generator.

An element 48 is provided within the air-bag, the element 48 being formed of a flame-proof or heat-resistant material. The element 48 defines an aperture 49 which is co-aligned with the aperture 47 provided in the front wall 41. The element 48 is stitched to the front wall 41 by stitching 50 which surrounds the apertures 47,49. The portion of the element 48 surrounding the aperture 49 serves to protect the front wall 31 of the air-bag from

heat and flame from the gas generator when the air-bag is inflated.

The element 48 is provided with two extending portions 51,52 which extend to the rear wall 42 of the bag. The element 51 is shown having its terminal region stitched to the rear wall 42 by stitching 53 which is the stitching which secures the side wall 46 to the rear wall 42. The rearwardly extending portion 52, however, forms a slightly modified version of the invention, and has the end portion thereof stitched to the rear wall 42 by stitching 54 which serves the sole purpose of securing the end of the rearwardly extending portion 52 to the rear wall 42.

It is to be noted that the rearwardly extending portion 51 defines, at a substantially central position, a transversely extending oval aperture or slit 55 and a similar aperture or slit 56 is provided in the rearwardly extending portion 52. The apertures or slits 55,56 serve to define a weakened area of the respective portion 51,52 at which each portion is designed to tear.

It can be seen that the rearwardly extending portion 51 and the rearwardly extending portion 52 each effectively form a tear tab, being an element which initially restricts the amount of inflation of the air-bag but which, subsequent to tearing, permits a fuller inflation of the air-bag.

Whilst the invention has been described with reference to embodiments in which the bag is made of different components of fabric which are stitched together, it is to be appreciated that an embodiment of the invention may be constituted by a bag formed from one single element of fabric.

CLAIMS:

1. An inflatable bag adapted to protect a driver or passenger in a motor vehicle, the bag being formed from fabric, portions of the fabric being secured together by securing seams, wherein the bag is provided with one or more tearable means, the or each tearable means comprising an element of fabric provided with an area of weakness at which the fabric is designed to tear, the tearable means being so located that when the bag is exposed to an internal pressure in excess of a predetermined pressure, the tearable means tear and control the way the bag is inflated, the interior volume of the bag being greater when the tearable means have broken than before the tearable means have broken, the tearable means, comprising elements which do not contribute to the integrity of the bag.
2. A bag according to Claim 1 wherein the tearable means comprise one or more elements of fabric each provided with a notch or recess, or aperture to define said area of weakness at which tearing across the fabric can occur.
3. A bag according to Claim 1 wherein the tearable means comprise fabric that is formed integrally with fabric forming the bag.
4. A bag according to Claim 1 or 2 wherein the tearable means comprise separate elements which are secured to the fabric forming the bag.
5. A bag according to any one of the preceding Claims wherein the fabric of the tearable means is a flame-retardant fabric.

6. A bag according to Claim 5 wherein the fabric of the tearable means is secured to the fabric defining the air-bag at a position surrounding an aperture formed in the material forming the air-bag intended to provide an inlet for gas from a gas generator.

7. A bag according to any one of the preceding Claims wherein one or both ends of each tearable means is secured to the bag by a seam provided to hold areas or components of the bag together.

8. A bag according to any one of Claims 1 to 6 wherein one or both ends of the tearable means is secured to the fabric forming the bag by a seam which serves the sole purpose of securing the tearable means to the fabric of the bag.

9. A bag according to any one of Claims 1 to 8 wherein the or each tearable means extends across a tuck formed in the bag.

10. A bag according to any one of Claims 1 to 8 wherein the or each tearable means extends across parts of the bag which are of "concertina" form.

11. A bag according to any one of Claims 1 to 10 wherein the or each tearable means is on the exterior of the bag.

12. A bag according to any one of Claims 1 to 10 wherein the or each tearable means is on the interior of the bag.

13. An inflatable bag substantially as herein described with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

14. An inflatable bag substantially as herein described with reference to and as shown in Figure 4 of the accompanying drawings.

15. An inflatable bag substantially as herein described with reference to and as shown in Figures 5 and 6 of the accompanying drawings.

16. Any novel feature or combination of features disclosed herein.

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

-13-

Application number  
GB 9315698.2

**Relevant Technical fields**

(i) UK Cl (Edition L ) B7B (BSB)

(ii) Int Cl (Edition 5 ) B60R 21/16, 21/24

**Databases (see over)**

(i) UK Patent Office

(ii)

**Search Examiner**

PAT EVERETT

**Date of Search**

SEPTEMBER 1993

Documents considered relevant following a search in respect of claims 1-15

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	US 5048863 A (DAIMLER-BENZ)	

Category	Identity of document and relevant passages - 14 -	Relevant to claim

#### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

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